III. Remarks Concerning Rejection Under 35 U.S.C. § 103

Claims 1–20 have been rejected under 35 U.S.C. § 103(a) as obvious over United States Patent No. 6,706,108 B2 to Polston (henceforth "Polston").

A. Examiner's Reasons for the Rejection

The examiner's reasons for the rejection are set forth under the captions "35 U.S.C. § 103" and "Response," and are as follows:

> Polston teaches a method of making a road base (*i.e.* a "load bearing structure") by mixing drill cuttings and pozzolan and thus anticipates [Applicant's] instantly claimed inventions. Even if not anticipated, overlapping ranges of amounts would have been *prima facie* obvious to one of ordinary skill in the art.
>
> Further, the alleged new matter limitation of "said load bearing structure having sufficient resistance to rutting that any rut formed in such surface by 10,000 applications of a single axle load of 18,000 pounds will have a depth of rutting that is less than 1 inch" would have been [an] expected property since the prior [art] contains the same exact components and also mixes to form a load bearing.
>
> . . .
>
> **Response**:
>
> The rejection under 35 USC 102 has been withdrawn and only 35 USC 103 remains over the claimed invention over Polston. The applicants argue briefly that Polston (on page 11 of their response) teaches away from their claimed invention. The examiner disagrees. Polston teaches the applicants' claimed limitations of "at least one of groups 2.1." Polston teaches adding binder such as cement, fly ash, lime, and kiln dust thus meeting the limitation of the claimed stabilizers (col.2, line 46). The applicants' invention merely reads upon mixing drilling cuttings and these binders or stabilizers and thus meets the limitations of the claimed invention. The examiner disagrees that this rejection is untenable because it meets the applicants' claimed invention limitations. The load bearing strength would have been expected to be the same because the same components are mixed and the same properties would have been expected to result.

(Examiner's Action, page 2, lines 12–20 and page 3, lines 3–15).

B. Applicant's Claimed Invention

Applicant's process as set forth in claim 1 is directed to the construction of load-bearing structures incorporating drilling cuttings. In one embodiment, the process comprises four steps. The first and second steps are forming a particulate mixture comprising drilling cuttings and mixing the particulate mixture comprising drilling cuttings with at least one stabilizer selected from the group consisting of quick lime, hydrated lime, Portland Cement, Class C fly ash, cement kiln dust, lime kiln dust, Class F fly ash and other pozzolans to form a cementitious second mixture. The third step is ***forming said cementitious second mixture into the shape and size of the load-bearing structure*** (*emphasis added*). The fourth step is causing the shaped and sized second mixture formed in the third step to undergo a pozzolanic reaction to form said load-bearing structure. The load-bearing structure has sufficient resistance to rutting that any rut formed in such surface by 10,000 applications of a single axle load of 18,000 pounds will have a depth of rutting that is less than 1 inch.

The process of claim 1 is also directed to an alternative embodiment using foamed and emulsified asphalt in place of the pozzolanic stabilizer. The claimed four-step process for asphalt comprises first and second steps of mixing said particulate mixture comprising drilling cuttings with at least one of foamed asphalt and emulsified asphalt to form an asphaltic second mixture and forming said asphaltic second mixture into the shape and size of the load-bearing structure. The remaining steps comprise causing the shaped and sized asphaltic second mixture formed in the second step to form the load-bearing structure and curing said shaped asphaltic second mixture formed into said load-bearing structure. The resulting cured structure has sufficient resistance to rutting that any rut formed in such surface by 10,000 applications of a single axle load of 18,000 pounds will have a depth of rutting that is less than 1 inch.

Claims 2–20 are dependent upon claim 1 or upon a claim dependent upon claim 1. Accordingly, claims 2–20 also comprise the subject matter in claim 1 set forth above.

C. Subject Matter Disclosed in Polston

The Polston invention relates to a method to produce road base material using recycled oilfield waste, "oil and gas waste" and aggregate waste and a novel road base material (Abstract). According to Polston:

> FIG.1 shows that tank liquids (**30A**) and truck solids (**30B**), collectively referred to as oil and gas waste material (**10A**) is obtained from an oil field site (**32**) including, but not limited to drilling sites, pit clean-up sites, spill clean-up sites, blow-out sites and oil and gas exploration, pipelines and refining industry or production sites. Typically the oil and gas waste material (**10A**) will be either "liquids" transported away from the oilfield site (**32**) in vacuum trucks or waste of a more "solid" or "slurry" consistency and transported in dump trucks. The oil and gas waste material (**10A**) is transported from the oilfield site (**32**) to a mixing site (**16**) by a first transport by a vacuum truck for liquids ("tank liquids") (**30A**) or a second transport such as a dump truck for the "slurries" ("truck solids") **30B**.

(Polston, col. 4, line 55 to col. 5, line 1).

The subsequent steps of the Polston method occur at the mixing site. Polston describes the remaining steps of the method as follows:

> In order to further the environmental objectives of the present invention, it is desirable to isolate the oil and gas waste material from the environment prior to mixing. Thus, while the aggregate may be stored on the ground, oil and gas waste material should be stored surrounded by a berm and/or placed on a cement pad, or otherwise isolated by a physical barrier that will prevent leaching of liquid contaminates into the soil. This also prevents storm water runoff. The manufactured road base typically is mixed, processed, and likewise stored surrounded by an earthen berm and on a cement pad and/or other physical barrier that will prevent leaching of liquid contaminates into the soil.

(Polston, col. 3, lines 19–30).

At the mixing site, the oil and gas waste material is treated to at least remove some of the liquids therefrom (typically oil and water) so as to prepare a treated oil and gas waste/road base component material for mixing (with an aggregate) to produce a road base composition, sometimes simply called "road base." (Polston, col. 3, lines 54–56 and col. 5, lines 14–18). After the material is thoroughly mixed in the pug mill, it is deposited on the ground and may be contained by a berm on [or?] an impervious layer for curing (typically for about 48 hours). (Polston, col. 8, lines 19–22).

D. Comparison of Subject Matter of Applicant's Invention with Subject Matter of Polston

Applicant's invention as claimed in pending claims 1–20 differs from Polston in the preparation of a load-bearing structure having sufficient resistance to rutting that any rut formed in such surface by 10,000 applications of a single axle load of 18,000 pounds will have a depth of rutting that is less than one inch. As set forth above, Applicant's process includes the steps of forming a cementitious (or asphaltic) second mixture into the shape and size of the load-bearing structure and causing the shape and size of the second mixture to undergo a pozzolanic reaction to form said load-bearing structure.

The Polston method involves mixing at a mixing site a treated oil and gas waste/road base component material in the pug mill to produce "road base." After the material is thoroughly mixed in the pug mill, it is deposited on the ground and may be contained by a berm on [or?] an impervious layer for curing (typically for about 48 hours). (Polston, col. 8, lines 19–22). The Polston method does not disclose or suggest Applicant's claimed process steps of forming the Polston mixture into the shape and size of the load-bearing structure and causing the shaped and sized mixture to undergo a pozzolanic reaction to form said load-bearing structure.

Applicant's claimed process is used to form high load-bearing civil engineering structures such as vehicle roads and drilling pads. By this process, Applicant's cementitious (or asphaltic) second mixture is formed into the shape and size of the load-bearing structure (*i.e.*, the road or pad) and caused to undergo a pozzolanic or asphaltic stabilization reaction to form the high load-bearing structure. In contrast, as noted above, the Polston product is not shaped and undergoes the curing or pozzolanic reaction at the mixing site. Accordingly, in order to use the Polston cured product as a road base material, the Polston cured product must be transported from its mixing site to the site of a road bed. Hence, the Polston method results in the production of road base material formed of aggregates of particles and is, therefore, not the same as Applicant's claimed process of preparing a load-bearing structure which has undergone a pozzolanic reaction, resulting in the load-bearing structure having sufficient resistance to rutting, that any rut formed in such surface by 10,000 applications of a single axle load of 18,000 pounds will have a depth of rutting that is less than one inch.

E. Declaration of Dr. Dallas N. Little, Ph.D.

Applicant submits herewith as **EXHIBIT A** a Declaration of Dallas N. Little, Ph.D. ("Declaration of Dallas N. Little, Ph.D.").

Declarant is an expert on the state of the art relating to Applicant's claimed subject matter and the Polston patent. As set forth above, Applicant's claims are directed to the formation of load-bearing structures such as roads and drilling pads. Applicant's claims include a requirement that the load-bearing structure has "sufficient resistance to rutting that any rut formed in such surface by 10,000 applications of a single axle load of 18,000 pounds will have a depth of rutting that is less than 1 inch" (henceforth referred to as "Applicant's claimed resistance to rutting"). Dr. Little's educational background and professional experience in the materials, engineering and pavement design fields render him eminently qualified to provide opinion evidence of Applicant's claimed structures and how they differ from the disclosure in Polston and Polston's road base materials.

1. Dr. Little's Educational Background

Dr. Little was granted the degrees of Bachelor of Science in Civil Engineering by the United States Air Force Academy ("Air Force Academy") in 1970, Master of Science in Civil Engineering by the University of Illinois in 1973, and Doctor of Philosophy in Civil Engineering in 1979 by Texas A&M University. (Paragraph 1, Declaration of Dallas N. Little, Ph.D.).

2. Dr. Little's Employment History

From 1970 to 1976, Dr. Little was employed by the United States Air Force as a civil engineer. During that time, he served as chief of construction management at Craig Air Force Base, Alabama, station engineer at Cold Bay, Alaska, and instructor and assistant professor of civil engineering at the Air Force Academy. (Paragraph 2, Declaration of Dallas N. Little, Ph.D.).

Since 1976, Dr. Little has been employed by Texas A&M University. He now holds the following positions at Texas A&M and its associated institutes: the E. B. Snead Chair Professor in Transportation Engineering in the Civil Engineering Department of Texas A&M University; senior research fellow at the Texas Transportation Institute; and associate director of the International Center for Aggregates Research, which is a joint center between Texas A&M

University and the University of Texas at Austin. (Paragraph 3, Declaration of Dallas N. Little, Ph.D.).

3. Dr. Little's Consulting Activities

Dr. Little has served as a materials engineering and pavement design consultant on major new construction and rehabilitation projects at the Denver, Colorado, International Airport, Hobby (Houston, Texas) Airport; Bush Intercontinental Airport (Houston, Texas) and Schipol International Airport in The Netherlands and on major highway projects.

Dr. Little has served as a consultant for numerous companies including Koch Industries, DuPont, Exxon, Shell, Mobil, ALCOA, Burlington Resources and Martin-Marietta. Dr. Little has also served as a consultant for numerous government agencies in the United States, including the City and County of Denver, the City of Houston (Houston Airport Services); United States Air Force, United States Department of Justice, the Environmental Protection Agency, Texas Attorney General, Michigan Attorney General, Georgia Attorney General, Utah Attorney General and Nebraska Attorney General. Dr. Little has also served as a consultant for foreign government agencies, including Queensland Cement Limited (Brisbane, Australia); Australian Stabilization Association; VicRoads, Melbourne, Australia, MainRoads, Brisbane, Australia, Road and Traffic Authority, Sydney, Australia, the National Lime Association (Ancade) of Spain and associated geotechnical labs, the Institute of Engineers of Ireland and the Federal University of Ceara (Fortalez, Brazil). Finally, Dr. Little has served as a consultant to several contractors, including Brown & Root, Haliburton, Lhoist Group in Brussels, Belgium, and O'Keefe Stabilization and Remediation Contractors of London, England. (Paragraph 4, Declaration of Dallas N. Little, Ph.D.).

4. Dr. Little's Other Activities and Awards

Dr. Little has authored over 230 technical reports, including journal articles, and has given approximately 250 invited lectures on technical subjects.

Dr. Little is a fellow in the American Society of Civil Engineers, has twice been awarded the J.W. Emmons Award by the Association of Asphalt Paving Technologists and has received the Trinity Industries/C.V. Wootan Career Achievement Award for Research Leadership in Materials Engineering in 1999. (Paragraphs 5 and 6, Declaration of Dallas N. Little, Ph.D.).

F. Dr. Little Presents Opinion Evidence that Applicant's Claims 1–20 Are Patentable Under 35 U.S.C. § 103(a) Over Polston

1. Polston does not disclose the resistance to rutting limitation set forth in claims 1–20.

Dr. Little disagrees with the examiner's conclusion that:

> ... [T]he ... the limitation of "said load-bearing structure having sufficient resistance to rutting that any rut formed in such surface by 10,000 applications of a single axle load of 18,000 pounds will have a depth of rutting that is less than 1 inch" would have been [an] expected property [in the load-bearing materials in the Polston patent] since [Polston] contains the same exact components and also mixes to form a load bearing [structure].

(Examiner's Action, page 2, lines 14–18).

Dr. Little's expert opinion is based in part on his conclusion that Polston lacks any disclosure for measurement of the resistance to rutting limitation to one of ordinary skill in the art. As Dr. Little explains:

> A civil engineer of ordinary skill would realize that achieving the level of resistance to rutting specified by the claims pending in the above-captioned and titled application requires considerably more than simply that "the prior art contains the same components and also mixes to form a load-bearing structure," as the examiner has presumed. In fact, achieving this level of rutting or plastic deformation resistance in the road would be reasonably expected by a civil engineer of ordinary skill only if and when critical material properties related to the rutting resistance of a representative sample of the entire road structure to be built have been determined by laboratory testing and the rutting (or plastic deformation) rate and/or magnitude has been reliably estimated by well-established and empirically derived correlations between pavement properties and observed practice. The properties related to rutting potential include at least:
>
> > the resilient moduli of all the layer(s) in the road that are above the natural earth subgrade and the resilient modulus of the natural subgrade itself,
> >
> > the thickness(es) of the layer(s), and
> >
> > the compressive strengths of the layers as well as that of the natural earth subgrade.
>
> One example of a suitable correlation method for reliably estimating the rutting resistance without actually measuring it is described in the specification of the above-captioned and numbered application. In so far as is known to the declarant, any suitable method for reliably estimating the rutting resistance without actually measuring it requires knowledge of at least the three properties [noted] . . . above. However,

> the Polston reference does not give any experimental data on rutting or plastic deformation resistance directly or method to assess such deformation, and this reference also does not give any experimental data on any of the three properties noted . . . above. This reference therefore can not give a civil engineer of ordinary skill any reasonable expectation that the rutting or plastic deformation resistance required by the pending claims can be achieved by following the teachings of this reference.

(Declaration of Dallas N. Little, Ph.D., page 3, line 13 to page 5, line 3).

2. <u>Polston discloses a road base, not a road.</u>

Dr. Little's expert opinion is that the Polston patent discloses a road base, not a road. Dr. Little gives the following reasons for his opinion:

> A civil engineer of ordinary skill would recognize that the Polston patent teaches the manufacture of "road bases" and of compositions for making road bases by spreading the compositions on a road base site and that the practical use of a road base is to support an overlying material, usually called "surface layer," that constitutes the final outer surface of a road ready to be used. The road base, together with the overlying surface, and the natural earth subgrade and any other intermediate layers that may be present, also supports traffic loads after the construction of the road is completed and the road begins to be used. After a road base is surfaced, the surface as well as the road base will be part of the road that is susceptible to being rutted or plastically deformed by traffic loads. Therefore, rutting resistance is not confined to the base layer but affects all layers as they interact as a system.... Additionally, a road base normally consists of an unbound aggregation of particles. The resilient modulus of such an aggregation can not be determined from knowledge of the compressive strength alone but also depends on the interaction of particles, which is strongly influenced by the stress state developed within the aggregate base and the level of confinement produced within the base. The resilient modulus and shear strength of the aggregate base and its level of stress sensitivity are also strongly impacted by such factors as the mixture of particle sizes and the shape and texture of the particles Therefore, if one decided to use an aggregation of particles as the outer surface of a road, even though such an action would already be a variation from the teachings of Polston, with no suggestion in Polston's teachings to do so, this additional information would be required to give a civil engineer of ordinary skill a reasonable expectation of achieving the rutting resistance claimed. This additional information is also not in the Polston reference.

(Declaration of Dallas N. Little, Ph.D., page 5, line 4 to page 6, line 4).

G. The Examiner Has Not Made a Prima Facie Case of Obviousness of Applicant's Claims 1–20 Under 35 U.S.C. § 103(a) over Polston

1. Requirements for a *prima facie* case of obviousness

Requirements for establishing a *prima facie* case of obviousness are set forth in the Manual of Patent Examining Procedure ("MPEP") at Section 2142, the pertinent part of which is set forth below:

> To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. ***Finally, the prior art reference*** (or references when combined) ***must teach or suggest all the claim limitations. The teaching or suggestion to make the claim combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure.*** *In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). . . . (emphasis added)*
>
> The initial burden is on the examiner to provide some suggestion of the desirability of doing what the inventor has done. ***"To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references."*** *Ex parte Clapp*, 227 USPQ 972, 973 (Bd. Pat. App. and Inter. 1985) (*emphasis added*).

Accordingly, the examiner's rejection must be analyzed by a two-stage process as set forth in *Surrey*, 319 F.2d, 233, 235, 138 USPQ 67, 69 (CCPA 1963). If the structural similarity . . . establishes a *prima facie* case of obviousness, then appellants can prevail only if they overcome such *prima facie* case. Hence, two questions are involved: (1) whether a *prima facie* case of obviousness has been established, and, if so, (2) whether the affidavits presented are sufficient to overcome the *prima facie* case of obviousness. *In re Piasecki*, 745 F.2d 1468, 223 USPQ 785 (Fed. Cir. 1984).

2. A *prima facie* case of obviousness has not been established by the examiner.

Applicant's comparison of the subject matter of Applicant's claimed process and the Polston method demonstrates that Polston does not teach or suggest all of the limitations in Applicant's process claim 1. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959); *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974) ("All words in a claim must be considered in judging the patentability of that claim against the prior art"). In fact, Polston discloses a process that does not include the process limitations set forth in Applicant's claim 1 of forming said cementitious (or asphaltic) second mixture into the shape and size of a load-bearing structure and causing the shaped and sized second mixture to undergo a pozzolanic reaction to form said load-bearing structure, wherein the resulting load-bearing structure (*i.e.*, the road or drilling pad) has sufficient resistance to rutting that any rut formed in such surface by 10,000 applications of a single axle load of 18,000 pounds will have a depth of rutting that is less than 1 inch.

As noted above, in the Polston process, the mixture is deposited on a berm or otherwise confined, but is not formed into the shape and size of the load-bearing structure, which is caused to undergo a pozzolanic reaction to form the load-bearing surface having Applicant's claimed resistance to rutting. Thus, the Polston method results in an unshaped cured mixture that must be broken up to produce a road base material consisting of an aggregate of particles or loose stones. Roads formed of such an aggregate of particles would be susceptible to rutting from vehicles having a single axle load of 18,000 pounds.

3. The examiner's *prima facie* case of obviousness, whether formally made or not, has been rebutted.

Applicant's comparison of the claimed invention with the disclosure of the Polston patent, and Applicant's submission of the Declaration of Dallas N. Little, Ph.D., demonstrate that the Polston patent does not render the claimed invention obvious under 35 U.S.C. § 103.

As set forth in the Declaration of Dr. Little, Polston's disclosure provides no reasonable expectation of success to one skilled in the art of obtaining Applicant's claimed limitation of the load-bearing structure having sufficient resistance to rutting that any rut formed in such surface by 10,000 applications of a single axle load of 18,000 pounds will have a depth of rutting of less than one inch. Although obviousness does not require absolute predictability, at least some

degree of predictability is required. Evidence showing there is no reasonable expectation of success may support a conclusion of non-obviousness. *In re Reinhart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976).

Dr. Little concludes that Polston contains no information or suggestion that would give one of ordinary skill in the art any reasonable expectation that through the Polston process a load-bearing structure containing the resistance to rutting limitation that is obtained according to the process set forth in Applicant's claim 1 can be achieved by following the teachings of Polston. (Declaration of Dallas N. Little, Ph.D., at page 4, line 15 to page 5, line 3).

Dr. Little observes that a person in the art following the teaching of the Polston patent would prepare a roadbed that contains, in addition to the Polston road base material, an outer or surfaced layer. Dr. Little then observes: "Therefore, rutting resistance is not confined to the base layer but affects all layers as they interact as a system." (Declaration of Dallas N. Little, Ph.D., Paragraph 8, page 5, lines 14–15). Polston provides no disclosure or suggestion about resistance to rutting of any layer of a road.

Dr. Little then notes that if, instead, the Polston disclosure is varied to characterize the Polston road base material as an outer surface, the result is a road made of an aggregation of particles. Such a road is not even a shaped and sized load-bearing structure. Dr. Little further observes that Polston provides no information to one skilled in the art as to how to prepare such a road with sufficient resistance to rutting that any rut formed in such surface by 10,000 applications of a single axle load of 18,000 pounds will have a depth of rutting of less than one inch. (Declaration of Dallas N. Little, Ph.D., Paragraph 8, page 5, line 24 to page 6, line 4). To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 980 (CCPA 1974). *See also* MPEP § 2143.03

If, as demonstrated above, claim 1 is unobvious over Polston, then claims 2–20 are also unobvious over Polston. If an independent claim is nonobvious under 35 U.S.C. § 103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

For the reasons set forth above, the rejection of claims 1–20 under 35 U.S.C. § 103(a) as unpatentable over Polston is untenable and should be withdrawn.

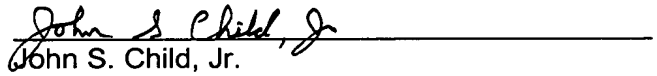
H. Other Matters

Although the examiner suggests that Polston anticipates Applicant's instantly claimed invention and the examiner refers to the "alleged New Matter Limitation" (Examiner's Action at page 2, lines 12–16), Applicant notes that, in fact, the Examiner's Action does not contain any rejection of Applicant's claims under 35 U.S.C. § 102 as anticipated by Polston, or under 35 U.S.C. § 112 as constituting New Matter.

IV. Conclusion

It is believed that the above Response constitutes a complete response under 37 CFR § 1.111 and that all bases of rejection in the Examiner's Action have been adequately rebutted or overcome. A Notice of Allowance in the next Office Action is, therefore, respectfully requested. The examiner is requested to telephone the undersigned attorney if any matter that can be expected to be resolved in a telephone interview is believed to impede the allowance of pending claims 1–20 of United States Patent Application Serial No. 10/037,630.

Respectfully submitted,



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